COMMONWEALTH OF AUSTRALIA

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Warning

CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 2, 2016

FINAL EXAMINATION	**DURATION**
SBI261 – Functional Anatomy	Reading Time: **10** minutes Writing Time: **180** minutes

INSTRUCTIONS TO CANDIDATES

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a CLOSED BOOK examination

Any non-programmable calculator is permitted

No handwritten notes are permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	**EXAMINATION MATERIALS TO BE SUPPLIED**
No additional printed material is permitted	1 x 16 Page Book Faculty/School Multiple Choice Answer Sheet

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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Section A

Multiple Choice Questions

Total No of Marks for this section: 50

This section should be answered on the Answer Sheet provided. Please ensure that your name and student number have been written on the Answer sheet and place in the completed answer Booklet.

Marks for each question are indicated. Suggested Time allocation for Section A: 50 mins

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This is the end of Section A. Total 50 marks.

Please ensure that you have written your name and student number on your answer sheet.

Section B

Short Answer Questions

Total No of Marks for this section: 50

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated. Suggested Time allocation for Section B: 65 mins

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Question 51

a) There are various situations where you may have to consider whether you are either obliged or required to provide information regarding an athlete under your guidance. Please provide four (4) examples that you may encounter. With each, give reason whether you would or would not provide information.

(Marks: 4)

b) What are the principles of Duty of Care that an exercise professional needs to be aware of in order to provide an appropriate and safe exercise environment?

(Marks: 4)

(Total marks: 8)

Question 52

Where is the interosseous membrane found? Describe the function of this membrane.

(Marks: 4)

Question 53

Identify two (2) anatomical characteristics that limit the range of motion at the wrist.

(Marks: 2)

Question 54

Briefly describe a function where Lombard's Paradox appears to occur. What type of muscle is involved? What type of contraction is it thought to be? Why it is not a true paradox?

(Marks: 8)

Question 55

Two common joint types of the appendicular skeleton are the hinge joint and the ball and socket joint. Compare and contrast the two. Include a brief discussion about the advantages and disadvantages of both types of joints.

(Marks: 7)

Question 56

Describe the functional movement of the scapula during an overhead throw, with particular focus on the role of rhomboid muscle acting on the scapula.

(Marks: 8)

Question 57

Describe what is meant by active insufficiency. Use diagrams to assist in your explanation.

(Marks: 5)

Question 58

Following are two paragraphs taken from two separate journal articles. Following this, there is a paragraph summarising the first two journal extracts.

Read each of the paragraphs.

Article 1 from:

Gleadhil, S., Lee, J. B., & James, D.A. (2016). The development and validation of using inertial sensors to monitor postural change in resistance exercise. *Journal of Biomechanics*. 49(7), 1259-1263..

> "*The strength of using inertial sensors is that they appear to monitor movement patterns more accurately than visual observation by experts and with as much confidence as 3D MoCap for timing measures, whilst remaining highly practical with possibilities to provide intelligent feedback in real time. The important outcome and major strength of this study is that it filled an important gap in the literature, for validating a new method of inertial sensor timing measures, and provided strong evidence and interpretations to support using inertial sensors to monitor differences in resistance exercise technique and common mistakes. This research provided support for past inertial sensor applications, a foundation for future applications, and future research recommendations to expand or repeat this research. Thus, inertial sensors have the potential for practical applications to lead to significant worldwide benefits for safety and performance increases in many important areas of society, specifically areas where lifting and resistance exercises are common practice, such as health and aged care, rehabilitation, working environments, recreational exercise and professional sport*."

Article 2 from:

Lee, J. B., Mellifont, R.B., Burkett, B.J., & James, D.A. (2013). Detection of Illegal Race Walking: A Tool to Assist Coaching and Judging. *Sensors* 2013, 13, 16065-16074.

> "*Inertial sensors were shown to have an accuracy rate of 91% when compared to a high-speed camera. The seven incorrectly identified steps occurred with a time change considerably less than what could be detected by the human eye. This research provides an opportunity to develop an inertial sensor based tool for coaching purposes that would assist athletes who are not aware they are performing illegal steps to correct their technique. Furthermore the ability to measure each step taken by an athlete suggests it may be possible that inertial sensors could be used as a tool to assist judges monitor Olympic and international race walking events*."

Summary paragraph

Inertial sensors can measure data in many areas of activity. In a study, Gleadhill, Lee, & James (2016) found inertial sensors look like they can monitor movement patterns more accurately than by the eye of experts and as confidently as 3D motion capture for timing measures, with practical possibilities to provide smart feedback live. Furthermore, not only can the sensors measure movement patterns, it can have other benefits. Wearable technology has been shown to reflect data taken from established and accepted technologies (Lee, Mellifont, Burkett et al 2013). In the study by these authors, the outcomes indicate that wearable technology offers a tool that can objectively measure race walking gait. This may ultimately offer a method that could take some of the controversy out of race walking competitions. What is demonstrated here is that technology can be applied in different areas of sport and provide benefits to those who use it.

a) In your opinion, does the summary paragraph breach academic integrity: does it plagiarise either or both of the two journal extracts? Yes or No

(Marks: 0.5)

b) Justify your opinion. Why did you decide the summary paragraph was or wasn't a breach?

(Marks: 7.5)

(Total marks: 8)

This is the end of Section B. Total 50 marks.

Please ensure you have written your name and student number on your answer booklet.

Section C

Short Essay Questions

Total Number of Marks for this section: 50

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated. Suggested Time allocation for Section C: 65 mins

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Question 59

The vertebral column is made up of four curves. List all four curves. How many vertebrae make up each curve? Identify which are primary spinal curves and which are secondary spinal curves. Additionally, in your discussion, please include the following:

- When lifting an object, why should flexion occur at the hips rather than flexion at the vertebral joints?
- Why should twisting of the vertebral column be avoided when carrying a load?
- Why should carrying heavy loads asymmetrically (on one side) be avoided?

(Marks: 10)

Question 60

Maintaining a good posture is important for many reasons. One of these is to maintain correct loading of the spine. Please describe why this is an issue in regards to sitting and standing at workstations.

(Marks: 10)

Question 61

Describe walking gait. You should include descriptions of: the inverted pendulum model; kinematic outputs of stride, step, and stance; phases of the gait cycle; and role of the hamstring group of muscles at the various stages of a walking gait cycle.

(Marks: 10)

Question 62

When an athlete is injured, there are 3 phases the injured site goes through. Is the inflammatory response phase, the 1st, 2nd, or 3rd phase? Please describe the inflammatory response phase.

(Marks: 10)

Question 63

When a person performs a calf raise (stands on their toes), effectively their whole bodyweight is supported. Please describe this functional move and include:

- What is the appropriate ankle joint movement description?
- In which plane does this movement occur?
- What are the predominant functional muscles involved in this movement (the calf raise)?
- What is the muscle contraction type of the muscles you have identified?
- What are the main antagonist and antagonist muscles?

(Marks: 10)

This is the end of Section C. Total 50 marks.

Please ensure that you have written your name and student number on your answer booklet.